**Questions About Steam Measurement and Industrial Boilers**
**Workgroup on Updating Allowance Allocation**
**March 25 Meeting**

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**3. Net vs Gross steam output:**

*Is there an equivalent of net electricity for an industrial boiler? (That is, an output that is sold by the company.) If so, what is it?*
*How would an industrial plant determine or measure net output for a unit?*

Both of these questions get back to how we define net vs gross. Moreover, I believe that the definition implied in the question, that net output is the amount that is sold, is incorrect. Before addressing that, I think it is worth reviewing the earlier discussion on net vs gross. The conclusions from the earlier discussion seemed to come down to:

- Gross may be easier to measure in some cases.
- Net is closer to our policy goal of recognizing the actual useful output delivered.

There were two additional issues that bear further discussion. One is treatment of internal energy consumption for pollution control. The other is the primary topic of discussion, which is how to define and measure net vs gross.

**Pollution control**
In earlier discussions, the point was made that some of the difference between net and gross may be loads related to pollution control and that it would be inappropriate to penalize sources for their efforts to clean up. I think that this argument misses the mark on several scores.

First, it compares sources with no controls vs sources with add-on controls. But it misses another important group, sources that practice pollution prevention. We would like to encourage pollution prevention and it should get credit for being clean without reducing efficiency. Perhaps more importantly, the argument assumes that similar units will be operating at different levels of environmental performance, i.e., an uncontrolled is operating equivalently with a controlled unit. Our focus should be on holding all similar sources to the same standards and then recognizing them for their efficiency at meeting those standards.

An example may be useful. If we look at $SO_2$ control, we have a source with no controls, a source with scrubbers and a source that uses low-sulfur coal. The unit with scrubbers loses some efficiency relative to the uncontrolled unit and might wish not to have to give that up in measuring its output. But the fuel-switched unit may be meeting the same emission rate without an efficiency loss or with less of a loss, and it should get credit for the greater efficiency on the basis of its net output. Thus, net output gives proper credit for meeting the standard most efficiently.

The uncontrolled unit may have fewer losses, but of course it is not meeting the same emissions standard. In a cap and trade program allocated on net output, the uncontrolled unit will get credit for its higher efficiency, but it will also require a greater number of allowances to cover its emissions. The greater allocation it gets due to a higher net vs gross output is unlikely to make up for the greater allowance requirement due to higher emissions relative to a controlled unit. It is unlikely to come out better in the system than a controlled unit or a fuel switched unit.

Finally, the point of output-based regulation is to reward what is actually delivered. If we start making exceptions for different kinds of inefficiencies, we are moving in the wrong direction and opening to door to further exceptions.

**The definition**

If we avoid this kind of exception, I think that the definition of net vs gross can be fairly straightforward. I would propose that net energy production be defined as the energy that is available for delivery to an end use other than the generation equipment itself. That end use could be on-site or off, separately purchased or not. The only requirement is that the use not be related to the actual generation of the electricity or thermal energy, including pollution control as discussed above. Conceptually then, the net output is the gross output minus the onsite-generated energy used for such applications as driving fans, blowers, pumps, or conveyors associated with the combustion or generation equipment or pollution control equipment associated with the generation equipment and minus energy that is used in the combustion or generation such as economizers and preheaters. All other energy is available for useful application and constitutes the net output. Because of the wide diversity of system configurations and commercial arrangements, we need to depend on this type of functional definition rather than one that focuses on what is sold, where the energy is used, etc.

In many cases, the existing metering will directly provide this net concept for industrial or power generation systems. In particular, systems that sell electric or thermal energy are likely to specifically track the output that is available for end use because it is also the output available for sale. Other systems may track simply because they are interested in the net output for their own use. In other cases, it is likely that metering will have to be modified to properly track this concept. In a few cases, it may be necessary to have multiple meters and do some calculations to properly track the net. There are too many configurations to say for certain. However, the basic concept should be clear enough that it can be accurately measured.

With this concept in mind, we have answered the second of the two questions (how to monitor) and with that answer we have answered the first as well, but differently than the assumption implicit in the statement of the question.

**3. Commercial value of steam**

All of these questions are based on the idea that the commercial component of industrial steam is the net output. Since we have determined in questions 2 that this is not the basis of a useful

definition, these questions are no longer necessary. Net output is defined by its use, not who uses it or how they pay for it.

**4. Appropriateness of comparing and converting steam and electric output**

The point of these questions seems to go back to the issue of allocating allowances to cogenerators, and particularly whether we need to adjust "allowance pools". If there were no cogenerators, this issue probably would not have come up. The model trading rule establishes two separate allowance pools - one for EGUs and one for non-EGUs. In a move to output-based allocation with no cogenerators, it seems that we would simply allocate based on output in each pool without having come up with the need to convert between electric and thermal output.

It seems that it is the treatment of cogenerators that raises this question and it seems that there is an inclination to try to convert all of the cogenerator output to either thermal or electric output. As discussed earlier, this is a hopeless task. There are too many technologies and variations for converting thermal energy to electricity, any of which could be claimed as the basis for this conversion factor. The range is too great. Moreover, such a conversion suggests that electricity is the ultimate energy form for all applications, which it is not. The losses inherent in generation of electricity are worthwhile for some applications, but clearly not all. Applying those losses automatically is not appropriate. Moreover, the group agreed at the meeting that thermal output should treated consistently for cogenerators and non-cogenerators. If a devaluing of the thermal output value were applied to cogenerators, it would have to be applied to all industrial boilers, which does not seem appropriate or politically viable.

The conversion issue seems to revolve around the issue of allocating from two pools. The two pool concept is part of the existing model rule. The existing part 96 requires that allowances be allocated to EGUs from an EGU pool and then that allowances be allocated from a non-EGU pool. The allowances in each pool are then normalized to the total available allowances.

However, there is a straightforward approach to allocating based on output without conversion and without confusing the pools. This approach is to combine the EGU and non-EGU pools into one pool. Under this approach we would allocate allowances from the total pool to each source at 1.5 lb/MWh electric and 2 lb/MMBtu$_{out}$ for any output from each source. Cogeneration units receive allocations for both forms of output. Finally, normalize to ensure that the total allocations match the available pool. This is a parallel and consistent approach to the original input-based approach except that it avoids the two pool problem. Allocations are at approximately the same rate as in the original input-based approach. No steam/electric conversion is necessary.

*If steam output data were not available from industrial boilers, how would states allocate allowances to cogenerators?*

I think this question tries to address the output-based allocation of allowances for electric generation with input-based allocation for non-EGUs. The approach then would be:

- Allocate allowances to power generators based on electric output.

- Allocate allowances to industrial boilers based on their heat input.
- For cogenerators, convert the thermal output to an equivalent heat input by dividing the thermal output by an average industrial boiler efficiency, possibly on the order of 75 to 80 percent. The exact value could be set through a consultative process with affected parties. Use the equivalent heat input as the basis to allocate allowances to the cogenerators for their heat input in the same way as all other industrial boilers.